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Docket No.: 50090-339

PATENT

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re Application of : Customer Number: 20277  
Takashi INBE : Confirmation Number: 6344  
Serial No.: 09/960,356 : Group Art Unit: 2811  
Filed: September 24, 2001 : Examiner: Gene Munson  
For: SEMICONDUCTOR DEVICE FOR DETECTING NEUTRON, AND METHOD FOR THE  
FABRICATION

**TRANSMITTAL OF APPEAL BRIEF**

Mail Stop Appeal Brief - Patents  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

Submitted herewith in triplicate is Appellant's Appeal Brief in support of the Notice of Appeal filed February 10, 2004. Please charge the Appeal Brief fee of \$330.00 to Deposit Account 500417.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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**Date: April 2, 2004**

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Sir:

This Appeal Brief is submitted in support of the Notice of Appeal filed February 10, 2004.

**I. REAL PARTY IN INTEREST**

The real party in interest is Renesas Technology Corp.

**II. RELATED APPEALS AND INTERFERENCES**

Appellant is unaware of any related appeals and interferences.

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### **III.STATUS OF CLAIMS**

Claims 3-5 are pending in this application. Claim 4 is allowed. Claims 3 and 5 have been finally rejected. It is from the final rejection of claims 3 and 5 that this appeal is taken.

### **IV.STATUS OF AMENDMENTS**

An amendment pursuant to 35 C.F.R. § 1.116 was filed December 9, 2003, in response to the final rejection dated September 10, 2003. The Examiner indicated, in the Advisory Action dated January 29, 2004, that the amendment would be entered upon the timely submission of a Notice of Appeal and an Appeal Brief.

### **V. SUMMARY OF INVENTION**

Neutron detection using a  $\text{BF}_3$  counter or radioactivation of a thin metal film is expensive and the apparatus required is large and bulky. This invention addresses and solves the problem of obtaining low-cost, real-time detection of neutrons. This invention provides a small-size, low-cost neutron detector that is capable of instantaneously monitoring and analyzing detected neutrons (page 1, lines 12-26 of the written description).

These benefits are provided by a semiconductor device for detecting neutrons comprising a semiconductor substrate and a boron containing layer formed on the semiconductor substrate containing isotope  $^{10}\text{B}$ . A PN junction is formed on a surface area of the semiconductor substrate below the boron containing layer. Electron - positive hole pairs are generated in a depletion layer of the PN junction by  $\alpha$  rays generated by a reaction between the neutrons and the isotope  $^{10}\text{B}$ . The

neutrons are detected on the basis of the quantity of electric charge of the electron - positive hole pairs (page 5, line 23 to page 6, line 8 of the written description). The semiconductor device further comprises an analyzing circuit portion on the semiconductor substrate in a region other than the region where the neutrons are detected. The analyzing circuit portion includes an amplifier circuit for amplifying a signal and a single channel height analyzer circuit for selecting only a pulse with a particular height to estimate an energy spectrum of the  $\alpha$  rays with the aid of counting or by measuring peak height distribution using a current flowing through the PN junction (page 3, lines 17 to 28 and page 6, lines 9-15 of the written description).

## VI. ISSUES

### A. The Rejection

Claims 3 and 5 are rejected under 35 U.S.C. § 112, first and second paragraphs, as indefinite and non-enabled

### B. The Issues

The Issues that arise in this appeal that require resolution by the Honorable Board of Appeals and Interferences (the Board) are:

Whether claims 3 and 5 are unpatentable under 35 U.S.C. § 112, first and second paragraphs, as indefinite and non-enabled.

## **VII. GROUPING OF CLAIMS**

The appealed claims all stand or fall together.

## **VIII. THE ARGUMENT**

### **A. The Examiner's Position**

Claim 3 is rejected under 35 U.S.C. § 112, first and second paragraphs, because the specification allegedly does not appear to describe a "an amplifier circuit for amplifying a fine signal and a single channel height analyzer circuit for selecting only a pulse with a particular height to estimate an energy spectrum of the  $\alpha$  rays with the aid of counting or by measuring peak height distribution using a current flowing through said PN junction." In addition, the terms "fine" and "pulse" are allegedly unclear. Further, it is allegedly unclear how "selecting only a pulse with a particular height" is related to "counting" or "measuring peak height." Furthermore, the Examiner asserts that the specification does not clearly describe the claimed analyzing circuit.

### **B. Appellant's Position**

In response to the Examiner's assertion that the scope of "fine" is unclear, "fine" has been deleted from claim 3. In response to the Examiner's assertion that "pulse" is unclear, Appellant submits that it is clear that a pulse is a pulse of current, as explained in the instant disclosure (Specification at page 6, lines 9-11).

Selecting only a pulse with a particular height is related to counting and measuring peak height distribution of the current pulses. Current pulses are amplified on the basis of the amount of electric charges collected from the depletion layer. A single channel height analyzer circuit selects only a

pulses with a particular height and the current pulses with a particular height are counted or the peak height distribution of the current pulses is measured. Appellant submits that it would be clear to one of ordinary skill in this art how selecting only a pulse with a particular height is related to counting or measuring peak height distribution.

The specification describes the semiconductor element to estimate an energy spectrum of the  $\alpha$  rays on page 6, particularly lines 2-15, and the components of a circuit to estimate an energy spectrum of the  $\alpha$  rays on page 3, lines 21-28

The Supreme Court set the standard for determining whether the specification meets the enablement requirement. That standard is whether undue experimentation is needed to practice the invention. *Mineral Separation v. Hyde*, 242 U.S. 261, 270 (1916); *In re Wands*, 858 F.2d 731, 737, 8 USPQ2d 1400, 1404, (Fed. Cir. 1988); MPEP 2164.01. Appellant submits that in light of the instant disclosure, one of ordinary skill in this art would be able to make and use the claimed invention. In particular, Appellant submits that one of ordinary skill in this art would recognize that the amplifier circuit and the single channel height analyzer estimate an energy spectrum of  $\alpha$  rays, and one of ordinary skill in this art would be able to make and use the analyzing circuit portion that estimates the energy spectrum.

There are many factors that must be considered when reaching a conclusion of lack of enablement. These factors include:

- (A) The breadth of the claims;
- (B) The nature of the invention;
- (C) The state of the prior art;
- (D) The level of one of ordinary skill;
- (E) The level of predictability in the art;

- (F) The amount of direction provided by the inventor;
- (G) The existence of working examples; and
- (H) The quantity of experimentation needed to make or use the invention based on the

content of the disclosure.

*Wands*, 858 F.2d at 737; 8 USPQ2d at 1404.

The Examiner's analysis of enablement must consider all the evidence related to each of these factors. Focusing on one or only several of the factors is not sufficient to determine whether an invention is not enabled. MPEP § 2164.01(a). There is no indication in the final rejection that the Examiner considered the above factors in reaching the conclusion of lack of enablement.

In order to make a rejection for lack of enablement, the Examiner has the initial burden to establish a reasonable basis to question the enablement provided for the claimed invention. *In re Wright*, 999 F.2d 1557, 1562, 27 USPQ2d 1510, 1513 (Fed. Cir. 1993); MPEP § 2164.04. The Examiner must provide a reason as to why the scope of protection provided by a claim is not adequately enabled by the disclosure. A specification disclosure which contains a teaching of the manner and process of making and using an invention in terms which correspond in scope to those used in describing and defining the subject matter sought to be patented must be relied on for enabling support. *See In re Marzocchi*, 439 F.2d 220, 224, 169 USPQ 367, 370 (C.C.P.A. 1971); MPEP § 2164.04. Applicant submits that one of ordinary skill in this art would know how to make and use the invention of claim 3 in light of the instant disclosure. The Examiner has not shown that the invention of claim 3 is not enabled for one of ordinary skill in this art. Applicant submits that claim 3 fully comports with the requirements of 35 U.S.C. § 112.

The Examiner avers that the specification does not clearly describe the analyzing circuit. However, the Examiner has the burden of showing that one of ordinary skill in this art would not know



how to make the analyzing circuit portion, which includes an amplifier circuit for amplifying a signal and a single channel height analyzer circuit for selecting only a pulse with a particular height to estimate an energy spectrum of the  $\alpha$  rays with the aid of counting or by measuring peak height distribution using a current flowing through the PN junction. Appellant submits that one of ordinary skill in this art, such as a circuit designer, would have known how to make the claimed circuit at the time of the invention. “Detailed procedures for making and using the invention may not be necessary if the description of the invention itself is sufficient to permit those skilled in the art to make and use the invention.” MPEP § 2164. Therefore, Appellant submits that claim 3 is enabled, as one of ordinary skill in this art would know how to make the claimed analyzing circuit portion.

The Examiner notes out that “[t]he response provided no evidence related to factors C through H that the specification would enable any person skilled in the art to make the circuit . . . .” However, as explained above, the Examiner must prove that the invention does not meet the enablement requirement. As the Examiner has not met the burden of proving the invention is not enabled, Appellant submits the rejection under 35 U.S.C. § 112 should be withdrawn.

## IX. CONCLUSION

Based upon the arguments submitted supra, Appellant respectfully submits that the Examiner's rejections under 35 U.S.C. § 112, first and second paragraphs, are not legally viable. Appellant, therefore, respectfully solicits the Honorable Board to reverse the Examiner's rejections of claims 3 and 5 under 35 U.S.C. § 112, first and second paragraphs.

09/960,356

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

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## X. APPENDIX

### Listing of Appealed Claims:

Claim 3: A semiconductor device for detecting neutrons comprising:

a semiconductor substrate;

a boron containing layer containing isotope  $^{10}\text{B}$ , the layer being formed on said semiconductor substrate;

a PN junction formed on a surface area of said semiconductor substrate below said boron containing layer; wherein

electron - positive hole pairs are generated in a depletion layer of said PN junction by  $\alpha$  rays generated by a reaction between said neutrons and said isotope  $^{10}\text{B}$ , and the neutrons are detected on the basis of the quantity of electric charge of the electron - positive hole pairs; and

an analyzing circuit portion, which includes an amplifier circuit for amplifying a signal and a single channel height analyzer circuit for selecting only a pulse with a particular height to estimate an energy spectrum of the  $\alpha$  rays with the aid of counting or by measuring peak height distribution using a current flowing through said PN junction, on said semiconductor substrate in a region other than the region where said neutrons are detected.

Claim 5: A semiconductor device according to claim 3, wherein no boron containing layer is provided on said analyzing circuit portion.